

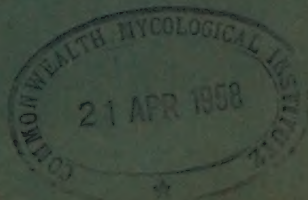


The
Imperial Forestry Institute
University of Oxford

THIRTY-THIRD ANNUAL REPORT
1956-57

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THIRTY-THIRD ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE ACADEMIC YEAR, 1956-57

Introduction. The year has not been marked by any unusual features. The number of students, particularly in the graduating class, was rather below normal, the drop being ascribable to the changed prospects in the dependent territories and a reduction of intake into the U.K. Forestry Commission, though recent graduates have been quite successful in finding other avenues of employment.

We have to record the tragic deaths of two former students: G. H. S. Wood who died in hospital at Kuala Belait, N. Borneo, as the result of burns sustained in an accident at his camp while on a collecting tour. Wood, who had been a Colonial Forestry Probationer, took First Class Honours in 1952; he first went out to Uganda but afterwards transferred to North Borneo as Forest Botanist. R. C. Culbert was killed just after the close of the year. He joined an O.U. Exploration Club expedition to the Karakoram Himalaya and was killed, it is believed in an avalanche, while trying to save another member of the expedition. Culbert, who was a New Zealander, had graduated in June, and was on his way back to New Zealand to join the Forest Service there.

Students. The number attending courses throughout the year was forty.

Nine students were successful in the examination for the Forestry Honours degree. The classes obtained were four Seconds and four Thirds, whilst one candidate had been too long since matriculation to be classed. Of the nine, three were Colonial Forestry Probationers and returned to their colonies; two obtained posts with the Colonial Forest Service and were posted to Kenya; one, whose home was in Southern Rhodesia, has returned and is hoping to get a post with the Southern Rhodesian Forest Service. One man has a post with the Forestry Commission in Northern Ireland, and one is doing temporary work for the Forestry Commission. The ninth was R. C. Culbert.

There were twelve students in the junior year, five from overseas.

The Forest Officers' course was attended by eleven officers from the Overseas Forest Service. They came from British Guiana (1), British Honduras (1), Sarawak (1), Cyprus (1), Kenya (2), Northern Rhodesia (2), Nyasaland (1), Sierra Leone (1) and Ghana (1), the last for two terms only. In addition, the Ecologist from Uganda spent two terms in the Department analysing data on tree growth collected in Uganda; he was also engaged on compiling information on tropical silviculture. An Assistant Conservator of Forests from Sarawak also spent a few weeks at the Institute studying aerial survey. He after-

wards joined the Management/Inventories Course, to which reference is made later.

Three Indian Forest Officers (from Bihar, Hyderabad and Madhya Bharat) attended the officers' course but there was no one from Pakistan this year.

Research Students. One student submitted a thesis entitled 'The influence of aeration on the growth and activity of tree roots' for the degree of D.Phil.; a B.Sc. was awarded. One student successfully submitted a thesis for the Diploma in Forestry entitled 'A study of the application to Australian forest management of selected mensuration methods and techniques current in certain countries of Europe'. Two other students, one from Burma and one from Canada, are studying for B.Sc. degrees.

Other Students. Three students are studying for the Diploma in Forestry. Two foresters, one from Cyprus and one from the Sudan, spent Hilary and Trinity Terms studying in the Department.

Prizes. The Schlich Memorial Prize was awarded to J. S. Spears, Assistant Conservator of Forests, Kenya, L. E. Dow's record being also strongly commended. J. C. Heaman, a Final Year undergraduate, was awarded the School of Forestry Jubilee Prize. The Coopers Hill War Memorial Prize was awarded to B. M. Savory who graduated in 1956 and is now a member of the Overseas Forest Service in Northern Rhodesia.

Instructional Tours (1) The Introductory tour in Britain for students starting the final honour school and others unfamiliar with British forestry was made as usual just before Michaelmas Term. The tour was conducted by Mr. T. E. Edwardson, and visits were paid to the Dean, Tintern and Crychan Forests of the Forestry Commission and Sir Richard Cotterell's Garnons Estate, Hereford. The utilisation visits included one to the Pine End plywood factory at Lydney, Gloucestershire.

(2) *Western France.* The party consisted of twelve undergraduates, two Indian forest officers, a Sudanese forester, and an Australian Diploma candidate. The usual forests of Normandy and the Landes were visited except that the forest of Montfort replaced those of Bord and Louviers. The tour was conducted by Mr. Edwardson.

(3) *Eastern France and Switzerland.* The nine final year students visited forests in the Vosges and Jura during the Easter Vacation. The tour was conducted by Dr. E. W. Jones.

(4) *Postgraduate Tour in Great Britain.* This annual tour, showing aspects of current developments in British Forestry, was conducted by Mr. Edwardson and Mr. Gordon, the party consisting of eleven forest officers of the Overseas Forest Service, two officers and a private student from India, and one officer from each of Australia, Iran and Thailand. Forests in the East Midlands and East Anglia were visited, the State Forests being Chiltern (Wendover, Bucks), Rockingham (Northants.), Swanton (Norfolk), Rendlesham (Suffolk): the private estate forests visited were Bacombe Warren (Lt. Col.

Tetley), Boughton (His Grace the Duke of Buccleugh), Melton Constable (The Grosvenor Estates) and Sprowston (Mr. S. R. Gurney). To the Forestry Commission and the private owners the Institute expresses its thanks for the excellent arrangements made.

(5) *Holland*. Nine Forest Officers, together with three Forest Officers from India and one from Thailand visited Holland for two weeks under the leadership of Colonel A. H. Lloyd and Dr. W. R. C. Handley. Among places visited mention must be made of the Forest Research Station at Wageningen, the Polder reclamation work, and the afforestation of sand-dunes. The thanks of the Department are due to the Director of the State Forest Service in Holland (Ir. F. W. Malsh) and to Ir. W. L. Jansen who conducted the party, and also to all other members of the Service and private owners who did so much to make the tour a success.

Additional Courses and Tours. A combined Management/Inventory course for forest officers on leave or deputation was arranged and took place from 24th June to 31st July. The course was attended by twenty-three forest officers from the Commonwealth and Burma, namely from the United Kingdom (3), Australia (2), Canada (1), British Guiana (1), Ghana (1), Malaya (1), Mauritius (1), Nigeria (2), Northern Rhodesia (2), Sarawak (1), Tanganyika (1), and Burma (7). The course began at Oxford with a ten-day programme of 18 lectures (7 on inventories and 11 on management) and discussions. The lectures were given by the Professor and members of staff, and also by Mr. C. A. Connell, Dr. F. C. Hummel, Mr. G. M. Locke and Mr. J. N. Jeffers of the Forestry Commission and by Mr. R. G. Miller, Deputy Director, Forest Air Survey Centre, Directorate of Colonial Surveys.

The lectures were succeeded by a week's tour in Wales and England where Forestry Commission forests in the Dean, Dovey, Dyfnant and Thetford Chase were seen. Dovey Woodlands (Chairman, Mr. Lloyd Owen) and a private forest of Major the Hon. Richard Coke at Weasenham were also visited. Then on 10th July the party went to the Continent to visit forests in Lower Saxony at Hann-Münden, the Spessart at Rohrbrunn, at Sachsenreid and Betzigau in Swabia, in Austria at Innsbruck, and in Switzerland at Tschier and Chur. The party then returned to Germany in the Black Forest to see forests near Villingen, and finally visited French forests at Remiremont in the Vosges and near Nancy.

The party was under the leadership of the Professor (until 21st July) and Mr. Edwardson and Mr. Osmaston, and included several discussions summarizing and assessing the problems and methods of management seen. Grateful thanks are due to the many British and Continental forest officers, too numerous to mention by name, and Mr. Lloyd Owen and Major Coke, who gave so freely of their time in helping to organize the tour and in conducting the party in the many forests seen.

Working Plans. The practical work was again carried out in the New Forest from the Forestry Commission hostel, Notherwood

House, under the supervision of Mr. Osmaston, assisted by Messrs. Edwardson and Gordon, and Dr. Jones.

Utilization Course. Final-year students spent two days in the various sections of the Forest Products Research Laboratory at Princes Risborough. Several Forest Officers visited the Forest Products Research Laboratory to discuss particular subjects. Special thanks are due to the Director and those members of his staff who gave demonstrations, etc.

Vacational Practical Work. Arrangements were again made through Mr. A. P. Leslie, an officer of the Ontario Department of Lands and Forests, for practical forestry work during the Long Vacation and six students worked for a period of about eight weeks in the Ontario forests. Mr. Höjer, Chief of the Swedish Forestry Service, also kindly provided employment for six students, and nine others worked in Norway under arrangements made by Professor Ihlen. Practical work of this kind is greatly appreciated by the students and the Institute is extremely grateful for these opportunities made possible by the personal help of the persons mentioned.

Excursions. During Trinity Term arrangements were made for Forest Officers to visit the following research centres and estates: Rothamsted Experimental Station, the John Innes Horticultural Institution, the Long Ashton Research Station, Bristol, Alice Holt Research Station (Forestry Commission), the Directorate of Colonial Surveys (Tolworth), Cirencester Estate, the property of Earl Bathurst, Bridge Street Sawmills, High Wycombe, and the timber yards of Messrs. William Mallinson & Sons Ltd. The final year students visited Checkenden Estate, the property of Mr. M. G. Reade, Cirencester Estate and Alice Holt Woodlands. They also visited Bridge Street Sawmills, High Wycombe.

The third year students visited local woods for field study of silviculture and soils with Dr. Jones. Wytham Wood has again proved useful for demonstration purposes.

Thanks are tendered to all who permitted students to visit their woods and works.

Discussions. During Michaelmas and Hilary Terms, weekly discussions of forest topics of general interest selected by the members of the Forest Officers course were organized as usual. During Trinity Term, short papers in selected topics (usually the Forest Officer's 'Advanced Study') were presented by the same group, each paper being followed by discussion.

Seminars on Regeneration of Tropical Forests. Four seminars on this subject were arranged during Michaelmas Term, this method of treatment having been found preferable to lectures.

Visiting Lecturers. The usual weekly series of invited lectures in Hilary and Trinity Terms was given. These lectures are primarily for the post-graduate class and dealt mainly with topics not fully covered by the staff of the Department. The lectures were followed by discussions.

The subjects and lecturers were:

- (1) *Seasoning and Preservation*. Mr. E. H. Nevard, Chairman of the Technical Committee of British Wood Preservation Association.
- (2) *Timber from the commercial point of view*. Mr. E. H. Richardson of Messrs. William Mallinson & Sons Ltd.
- (3) *Some new uses of wood*. Mr. B. Alwyn Jay, Timber Development Association, Ltd.
- (4) *What a sawmilling manufacturer would want to know from a Forest Officer when planning a new sawmill*. Mr. T. A. Stodart of Messrs Stenners, Tiverton.
- (5) *Land use problems as affecting forestry*. Professor L. Dudley Stamp, C.B.E., London School of Economics.
- (6) *Fire Protection systems in U.K. forests*. Mr. C. A. Connell, Forestry Commission.
- (7) *Timber Marketing*. Mr. E. G. Richards, Forestry Commission Secretary of Committee on Marketing of Woodland Produce.
- (8) *Factors determining the geographical distribution of plants*. Dr. W. B. Turrill, Royal Botanic Gardens, Kew.
- (9) *Rainfall: its variability and trends*. Dr R. P. Beckinsale. School of Geography, Oxford.
- (10) *The Examination and Interpretation of Aerial Photographs*. Mr. R. G. Miller, Deputy Director, Forest Air Survey Centre, at Directorate of Colonial Surveys, Tolworth.
- (11) *Locusts*. Dr. P. Ellis, Hope Department of Entomology, Oxford.
- (12) *Forestry versus Sheep Farming*. Dr. R. Phillips, Lecturer on Animal Husbandry at University College of Wales, Aberystwyth.
- (13) *Economics in Forest Management*. Mr. W. E. Hiley, Dartington Woodlands, Ltd., South Devon.
- (14) *Forest Tree Breeding*. Mr. J. D. Matthews, Forestry Commission Research Station, Alice Holt.
- (15) *Durability of Timber*. Dr. W. P. K. Findlay, Forest Products Research Laboratory, Princes Risborough.

Assistance from other Departments, etc. Special courses in surveying and soil science were given to the Forestry students by members of the two University Departments concerned. Mr. J. Fraser Scott, Assistant to the Reader in Biometry and Mr. G. B. Masefield, the University Lecturer in Overseas Agriculture, also gave courses to both the undergraduates and postgraduates. The thanks of the Department are extended to all lecturers concerned and the Heads of their Departments.

Assistance given to other Departments, etc. The Professor, with the assistance of Mr. Gordon, lectured on Colonial Forestry to the Overseas Administrative Cadets at both Oxford and Cambridge, the Overseas Agricultural Service Officers at the latter University also attending.

Staff Tours. Mr. Day was away from July, 1956 to January, 1957 investigating and reporting on the condition of forests in Cyprus from the pathological standpoint.

At the invitation of the President of the Ceylon Association for the Advancement of Science, the Professor went to Ceylon as Guest Lecturer at the end of Michaelmas Term, and remained in Ceylon for two weeks; the Professor also made a flying visit to Helsinki at the end of April as guest lecturer to the University and the Society of Forestry in Finland.

Dr. Leyton left this country on 13th March for a seven month visit to America. His visit was made possible by a grant from the Lockey Bequest towards his passage to and from America and a very generous grant of \$1500 from the Charles Lathrop Pack Forestry Foundation towards his expenses in the U.S. At the invitation of Dean Shirley and Professor Heiberg he spent some two and a half months in the New York State College of Forestry and with the cooperation of Professor Wilde, a month in the Soils Department of the University of Wisconsin. Further support from Allied Chemicals and invitations from various University Forest Departments and Institutions allowed him to travel extensively both in the U.S. and Canada.

Research Field Station. The Yorkshire Station at Wykeham has again been used by members of the research staff. Acknowledgement is made of the continued help given by the Silviculturist (North) of the Forestry Commission and by the Research Forester, Mr. Weatherell.

Scientific Societies, etc. Members of the staff have been active on the Councils and Committees of various societies, as in previous years.

Senior Staff. One additional member has joined the senior staff during the year, viz. Dr. A. Carlisle, *vide* under TREE PHYSIOLOGY below.

Technical Staff. There are now fourteen technical assistants working in the eight laboratories. The Photographer's and Artist's sections are staffed by two technicians, and the Workshops by three.

Secretarial Staff. There has been no significant change in the secretarial staff during the year.

WYTHAM WOODS

This is the tenth year since the work began of restoring the Wytham Woodlands to a productive condition. The afforestation of the Southern slope of Wytham Hill will be completed early next year and the older plantations are already beginning to lose their early patchwork appearance. The site of the planting area for 1957/8 is along the south side of the 'Singing Way' road and the recent clearing of the elder and thorn scrub on this area has considerably widened and improved the views across the Thames Valley.

Eleven acres were planted during the year with oak, ash, alder and poplar, mixed with coniferous species. The areas for planting during the next five years were approved by the Forestry Commission and additional areas will be planted during the next two years if the proposed exchange of part of Marley Wood for equivalent vacant agricultural land, is completed in order to make a larger area available for the Biological Reserve in Marley.

Thinnings in the widely scattered areas of sycamore and ash coppice continued to employ the greater part of the forest labour, and the sale of these thinnings for turnery poles again provided the larger part of the revenue. Stakes and poles were also sold from thinnings in the earlier plantations for the first time.

The prescribed annual felling of about 100 over-mature or decaying trees was again carried out but owing to the poor quality of the timber only low prices were obtainable.

The old overgrown hazel coppice in the outlying woods has proved to be unsaleable for hurdles or fencing but about two acres were felled and sold for firewood.

A considerable amount of preparatory drainage was found necessary on the planting areas and road drainage ditches were also excavated.

The sale of firewood blocks and fence-posts has been limited by the lack of an adequate building to house the sawbench and engine. Plans were made early in the year to build a sawmill shed and also to provide cover for the forest tractor and lorry. This will meet an urgent need and will enable work to be provided for the woodmen during the bad winter weather.

BAGLEY WOOD

Two more houses are being built to accommodate woodmen to strengthen the staff to enable it to deal with the heavy thinning programme prescribed by the working plan. Disposal of more of the produce in a semi-manufactured form has increased the need for labour at the mill and also for storage space. A large open-sided lumber shed has been erected this year, and the yard surface improved.

Young plantations are showing considerable promise; excessive competition from Japanese larch in mixture with oak, and the need for an intensive drainage system on some of the flatter clay sites are two of the current cultural problems.

A thinning and remeasurement of the Sycamore permanent plot was carried out.

Among visitors to Bagley Wood in the year were the Special Management and Inventory course at the Institute, and the Dean Forester Training School.

Rabbits have re-appeared in numbers sufficient to necessitate netting in new plantations.

SILVICULTURE

Dr. E. W. Jones gave courses of lectures in silviculture to third and fourth year students, together with practical courses in Bagley and Wytham Woods. He also assisted in the field-work of the Working Plan Party in the New Forest in September, and conducted the fourth year students on their tour of the French and Swiss Jura. He lectured to the forest officers on developments in plant ecology.

Several additions have been made to the Arboretum in Bagley Wood, the trees in the Arboretum remeasured, and a new edition of

the cyclostyled catalogue on exotics in the wood has been prepared.

Advantage was taken of a good seed year to carry out some further experiments on the storage and viability of acorns.

ECOLOGY

The usual course in Ecology was given to the postgraduate students by Dr. G. W. Dimbleby, who also took over this year the Forest Ecology course previously given by Dr. Jones to the third year students. This is being done to ease the heavy burden of teaching which Dr. Jones has been carrying.

Research work in the field was seriously curtailed by petrol rationing though this proved a blessing in disguise since it prevented the further accumulation of material for analysis and enabled a concentrated assault to be made on the laboratory work. As a result, much light has been shed upon the stages of soil genesis as man's influence increased on poor acid sites. Further work remains to be done, particularly on the New Forest material, but it is clear that the role of *Calluna* in initiating podzolisation must be re-assessed. A number of cases are now known where podzolisation was beginning before *Calluna* reached significant proportions: this is not to say, of course, that this species does not seriously intensify podzolisation, but it cannot always be blamed for initiating the process.

The most interesting outcome of the Yorkshire field experiments this year is the interim result of a statistical investigation, made by Dr. J. E. Satchell, Nature Conservancy, into the earth worm population which had appeared in our birch litter trial on Silpho Moor. In this trial birch litter (from branches, not from the ground) is being applied annually to screefed and untouched heather plots. Earth worms (mainly *Bimastus eiseni*) had appeared in considerable numbers in those plots to which birch litter had been added, but were virtually absent from all other plots. There appeared to be no difference in the numbers between screefed and heather-covered plots. Investigation is continuing into the origin of this worm population.

TREE PHYSIOLOGY

Courses of lectures were given in Forest Soils and Tree Physiology together with Soil and Vegetation studies in the field by Dr. L. Leyton.

Field and laboratory investigations continue into the mineral nutrient relations of forest trees with particular emphasis on foliar analysis. A number of trials, set up in collaboration with H.M. Forestry Commission Research Branch, have now been concluded and have been or are in the course of being analyzed and written up: these include: (1) the influence of NPK fertilizers on the growth and nutrition of Japanese larch (Broxa, Yorks, and Michaelston, S. Wales), (2) the effect of various treatments, shading, mulching, urea spray and nitrogenous fertilizer on the growth and nutrition of Sitka spruce on heathland (Nea Heath, Surrey and Broxa, Yorks), (3) the influence of NP fertilizers on a newly established Sitka spruce and Western Hemlock plantation (Clocaenog, N. Wales), (4) the effect of the litters

of various species on the nutrition of Sitka spruce (Broxa, Yorks). In order to test the consistency of foliar analysis data, a countryside survey has been made of the nutritional status of Japanese larch and Sitka spruce in relation to their growth and response to phosphatic fertilizers.

Investigations have begun into the water relations of forest trees and stands. Mr. R. C. Saxena (a Diploma candidate) has investigated the measurement of leaf suction pressure and soil moisture tension using a pressure chamber technique, and Dr. A. Carlisle has started on a comprehensive programme into the effect of the forest on water supplies.

In March, with the initial backing of the Charles Lathrop Pack Forestry Foundation, a seven month visit was made to the United States and Canada to survey and participate in investigations into various aspects of forest soil fertility and, in particular, tree nutrition. This visit included a month's stay in the Soils Department of the University of Wisconsin at Madison, and an eleven week's stay in the New York State College of Forestry at Syracuse; during these periods investigations were made into the nutrient relations of White (*Pinus strobus*) and Red pine (*P. resinosa*) respectively. By invitation, papers were presented at two symposia on Tree Physiology (Harvard Forest and Ohio Agricultural Experimental Station) and lectures given to the University Forestry Departments at Toronto, Laval, Yale, Michigan State and Washington State. Visits were also made to the University of Massachusetts (Botany Department) Cornell University (Agronomy Department), Washington D.C. (American Potash Institute) and Oregon (Pacific N.W. Forest and Range Experimental Station). Tours of forested areas with emphasis on soil fertility factors covered a wide area and included New England, Catskill and Adirondack regions, Michigan, Wisconsin, the Pacific North West (Washington and Oregon) and Western Ontario (Department of Lands and Forests). The support and cooperation provided by the above organizations and the hospitality of the numerous individuals concerned is gratefully acknowledged. Papers and reports on this visit are in the course of preparation.

SOIL SCIENCE

Special undergraduate lectures for forestry students were given by Dr. R. K. Schofield, Reader in Soil Science, and Mr. G. R. Clarke. Dr. Alex Muir again gave a course of lectures on tropical soils to the fourth year students and Forest Officers.

A course of lectures on soil organic matter and soil organisms was given to the third year undergraduates by W. R. C. Handley.

Studies on the processes of litter decomposition have continued with special reference to the release of nitrogen in mineralized form. The release of nitrogen from protein-leaf extract complexes when mixed with soil is being studied with the aid of a perfusion technique.

The influence of different tree species on the formation of water-stable aggregates in the upper soil layers of a variety of soils having different textures was studied by Mr. R. C. Culbert.

The amount of mineral nutrients (N.P.K.Ca.) extracted from the litter collected as soon as possible after it fell from the tree, of different tree species on treatment with distilled water under sterile and non-sterile conditions has been studied by Mr. J. C. Heaman.

The investigation into the chemical nature of the acidic constituents of leaf extracts particularly from *Rhododendron ponticum* L. was continued by Dr. H. Raudnitz. In connection with later developments of this work leaves of other species and further plant materials were examined and a number of organic acids were isolated and identified. Of special significance was a surface-active humic phosphate as it appeared to be widely distributed in the plant kingdom. A highly specific colour reaction was used to detect this compound in various plant materials.

FOREST BOTANY

Mr. A. C. Hoyle continued as Curator of the Forest Herbarium, and Mr. F. White as Forest Botanist. In December, 1956, after four years of industrious and capable service, Miss M. E. Griffiths resigned from her post as Herbarium Assistant to take an appointment as Taxonomist in the Department of Agriculture, Uganda. Consequently early in 1957 Miss J. Chandler was promoted to her place and the duties of Mrs. E. Woodley were extended. Two temporary assistants, Mrs. Eaton (part-time) and Miss A. Laurikainen, were employed for part of the year. The secretarial and mounting staff remained unchanged.

Teaching. Mr. Hoyle gave his usual courses in Systematic Forest Botany and in the Ecology of Dry Tropical Woodlands and supervised collecting by students.

As in previous years a number of students and forest officers made use of the collections and literature in the herbarium. Four of them were supervised by Mr. White for the course in Regional Systematic Botany. Mr. P. G. Adlard (Nyasaland) prepared a report on *Fire Protection and Regeneration in Dry Deciduous Woodland in Nyasaland*—an account of the vegetation and some fire-protection experiments in Mua Livulezi Forest. Mr. R. Barnes (Southern Rhodesia) made an assessment of generic characters in the Ebenaceae, with particular reference to *Royena*. Mr. B. W. Caudwell (Nigeria) made a study of the variation and taxonomic categories in the genus *Khaya*, a concise account of all available relevant facts, which should provide a basis for a more complete monograph when more material and information become available. A third year student began work on the genus *Symphonia*.

Research and Advisory Work. (1) *Brachystegia*: Mr. Hoyle continued his study, naming material for Forest Departments, for various herbaria and for individual collectors. He completed his treatment of the genus for Mr. White's Forest Flora of Northern Rhodesia. The genus has now been largely re-named and re-organized in the herbaria at Brussels and Paris. (2) *Ebenaceae*: A number of valuable collections were sent to Mr. White for naming, including

that made by Messrs. E. Milne-Redhead and P. Taylor of Kew in Tanganyika during 1955-6. The second part of *Notes on the Ebenaceae* was published in December and the third was sent to press. (3) *Terminalia*: Miss Griffiths finished her revision of the African species for publication in the Journal of the Linnean Society. (4) *Vegetation Map of Africa*: Mr. Hoyle and Mr. R. W. J. Keay collaborated in work on a new map compiled by the Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale and now in press. Mr. Hoyle has also assisted the Clarendon Press in preparing a vegetation map of North Africa. (5) Requests for identification of timber-correlated material were many and often involved complex investigation. Mr. Hoyle continued to collaborate with the Forest Products Research Laboratory, the Centre Technique Forestier Tropical at Nogent-sur-Marne, France, and with various timber-firms and individuals.

Forest Flora of Northern Rhodesia. During the year the first 500 pages of typescript were sent to Northern Rhodesia for checking by Mr. D. B. Fanshawe, and the first part is now in galley proof. A further 16 plates were drawn by Miss Griffiths and Miss Chandler and 30 blocks of figures from the *Flore du Congo Belge et du Ruanda Urundi* and *Flore Spermatophyte du Parc National Albert* have been lent to the Institute through the courtesy of Prof. W. Robyns and Mons. F. Jurion. Distribution of the duplicates of woody plants collected in Northern Rhodesia by Mr. Angus and Mr. White (see Ann. Rep. 1952-3) was started at the beginning of the Long Vacation. By the end of the Academic Year 3141 specimens were ready for dispatch.

Visitors and Enquiries. Among visitors who worked for short periods in the Herbarium were Messrs. R. A. Graham, J. H. Hemsley, R. W. J. Keay and N. K. Robson from Kew, Mr. G. H. S. Wood of the British North Borneo Forest Service, Mr. J. K. Jackson of F.A.O. from the Sudan, and Dr. J. Leonard of I.N.E.A.C., Brussels.

Forest Herbarium. Mounting and filing of specimens almost kept pace with the record post-war intake; 2734 specimens were mounted and 2972 were received, of which 864 were sent for identification and 2108 were named duplicates from other herbaria. Material for naming came principally from the Belgian Congo, Liberia, Nigeria, North Borneo, Northern Rhodesia, Nyasaland, Sierra Leone and Tanganyika. The largest accessions of named specimens were sent by the East African Herbarium (1304) and the Jardin Botanique de l'Etat, Bruxelles (502).

The following territories received identifications: Belgian Congo (45), Nigeria (5), Northern Rhodesia (75), Nyasaland (148), Sierra Leone (17) and Uganda (5).

FOREST PATHOLOGY

Mr. W. R. Day continued in charge of the section, assisted by Mr. F. H. Jones (Chief Technical Assistant), Mr. D. K. Barrett and Miss J. S. Palmer. The usual courses of instruction were given to the Honour School and the special course in Forest Hygiene to the post-

graduate students. As usual various exhibitions dealing with problems in Forest Pathology were given.

Mr. Day was seconded to the Colonial Forest Service from July, 1956 to January, 1957 to investigate and prepare a report on the condition of forests in Cyprus from a pathological standpoint. As a consequence Mr. A. Hji Yiannis of the Cyprus Forest Service, came to Oxford for the Hilary and Trinity Terms, for special training in Forest Pathology and laboratory technique.

Research (1) *Fungal infections in larch canker*. A paper has been accepted for publication in a coming number of *Forestry*.

(2) *Moisture saturation determinations in main stems of Japanese larch*. The year's work has confirmed the preliminary impression that, in the plantations studied, aged about 30 years, appreciable differences in moisture saturation occur in the sapwood, between trees on different sites; or occupying different positions on the same site, such as being on the edge, by a ride, or inside; or on a water-losing convexity, or in a water-receiving hollow. It has also been confirmed that, as reported by Chalk and Bigg for Sitka spruce (*Forestry* 29: 5-21), moisture saturation varies in different zones of the sapwood. The work also shows that there are variations according to position on the stem. The weather of the season also has an appreciable effect on moisture saturation. It is felt that these results are of considerable importance in the interpretation of pathological developments.

(3) *Bark necrosis on the lower main stem in Sitka spruce and other conifers*. Mr. F. H. Jones visited Kerry Forest in North Wales in October, 1956, and examined places in which this bark disease was reported to be severe. Comparison of assessments of injuries with records for the year 1953 showed that there had been an appreciable local increase in incidence and severity. A further examination in April, 1957, showed that there is a significant association of the dying of bark and the development of flutes on the lower main stem: in many cases the dead bark occurs directly in the hollow of a flute and the reasonable interpretation is that death is an extreme effect of the factors which cause fluting. Interesting evidence of the origin of flutes is their tendency to occur above wounds made during the extraction of thinnings. This suggests that a flute is caused by a local restriction of supplies and that when this restriction is sufficiently severe death takes place. The examination of root systems confirms this and indicates that soil conditions which prevent a full symmetrical development of the root system, downwards as well as sideways, favour the development of fluting. This phenomenon of fluting, with bark necrosis sometimes occurring in the flutes, is not confined to spruces, or to conifers: it is fairly common on beech, as they grow larger, on shallow soils. The fungus ecology of this type of bark necrosis has not been worked out.

(4) *Canopy development in areas subject to bark necrosis*. It has been noticed for some time that stands which have suffered from bark necrosis tend to occur in areas in which drought crack is also found. In such areas, peculiarities in canopy development may be found:

such as a tendency for an appreciable, and sometimes high proportion of early deaths due to suppression, and often for an early undue loss of foliage density, even on dominant trees. It is hoped to pursue these studies which may throw light on the conditions which help to determine some bark and root diseases.

(5) *The anatomy of necrotic areas.* Some more work has been done. An examination of specimens from the Sarn Hills of Kerry Forest showed that the necrosis began at the beginning of the growing season in 1947 and not during the extremely dry later summer, though an extension of the affected area took place then. The indications are that death of bark occurs with relative suddenness as the result of temporarily adverse conditions. One consequence of this is that extensions of necrotic areas occur irregularly, both in position in the affected area and time of occurrence. There is, in fact, symmetry in extension which is sometimes associated with enlargement of necrotic areas.

The common occurrence of collapse in the cambial zone has previously been noted. It was of particular interest to find, in the investigation of gum zones in the phloem of *Eucalyptus gomphocephala* and the wood of *E. camaldulensis*, that collapse in the developing phloem or xylem could be seen to have taken place consistently at the time of their formation. The phenomena of loss of foliage density and dying back of roots, so commonly associated with bark necrosis on the main stem in conifers in North-Western Europe, also occurs on these trees and it can be shown that difficult conditions for soil supply help to induce the development of these things. The local splitting and sometimes death of bark also occurs on these eucalypts, in association with gum zone formation. This type of phloem necrosis is also common in Black and Aleppo pines on the Troodos mountains and, when severe, results in the girdling of stems and the death of the top of the tree or the end of a branch. Death is actually hastened by infestation with bark beetles, especially *Pityogenes bidentatus*. It is clear that this type of disease is associated with sites in which a deficiency in water supply is likely to occur and that in these localities dying back of roots and early loss of foliage density is also common.

The development of similar phenomena in widely differing species of tree and under very different climatic conditions, points plainly to the fundamental importance of temperature, rainfall and soil in providing the foundation for health or disease, so that trees adversely affected by these basic conditions show similar symptoms of disease.

Other items. *Nectria species.* Mr. Hji Yiannis isolated *Nectria coccinea* from small cankers on beech in Coed-y-Brenin, Merionethshire. Inoculation into beech near Oxford gave successful infections from which the fungus was re-isolated. Other organisms and particularly bacteria were however, also isolated and it appears that the microfloral ecology of these small cankers needs closer study. *N. coccinea* was also isolated from twigs of rowan and white beam which had been girdled at the base of the last annual growth. A

number of cases of this were observed, sometimes in places where it is known not ordinarily to occur. The suggestion is that some climatic factor may have played a part in this girdling of twigs. An unidentified species of *Nectria* was also isolated from necrotic areas on Sitka and Omorica spruce in Kerry Forest: here again a closer study of the sequence in infection is needed, to define the role of the fungus. *N. inventa* was also isolated from the wood of beech branches in which pruning wounds had healed. Here there seemed to be no parasitism but infection of exposed wood by a saprophyte. Other species of *Nectria* have previously been isolated from the wood of living trees, sometimes when there was no obvious means of entry, e.g. *N. mammosa* P. & P. var. *rubi* Weese, in Norway spruce.

Heartwood infections in Japanese larch. The stem of a living and apparently uninjured tree, cut in a first thinning near Dulverton, Devon, showed discoloration in the heartwood and was sent to Oxford. A *Peniophora* species, identified by Dr. Findlay of the Forest Products Research Laboratory as probably *P. velutina*, was isolated. Similar infections of thinnings of this species have been observed before, when *Stereum sanguinolentum* was isolated. It is clear that infections capable of causing heart rot in the main stem can take place early in life: what is not clear are the conditions which make this possible.

Infection of Metasequoia glyptostroboides by *Armillaria mellea*. One of the small trees planted in the garden at St. John's College at Oxford died, and was found infected by this fungus. This is not surprising, but it is probably a first record in Britain.

Phomopsis pseudotsugae on *Japanese larch*. A Japanese larch in Tubney Woods, near Oxford, was observed to bear a small necrotic area occupied by this fungus. An anatomical examination showed that this tree had suffered from drought; first in July, 1952, when the partial collapse, but no actual death, in the cambial zone took place and then in the dry summer of 1955, when the observed local death of bark occurred. The evidence was clear that drought injury was the important cause of disease. It is known from past experience that the Calcareous Grit sand, on which the tree grew, is subject to water shortage and with some species especially, e.g. Douglas fir, die-back of root systems with infection by *Fomes annosus* is particularly liable to occur because of this.

Soil temperature and the growth of Sitka spruce and Japanese larch. The observation that bark necrosis on Sitka spruce in Kerry Forest began in the spring of 1947, suggested that low soil temperatures caused by melting snow might have had some influence. To test the influence of a low soil temperature on the growth of this species, two plants together, for comparison, with two plants of Japanese larch, were kept from early spring to midsummer, with their roots at a constant temperature of 36° F. The crowns were at room temperature, about 60°—65° F. One control plant of each species was kept at room temperature, while three other plants of each species were kept outside under natural conditions of temperature. The

control plants did not differ appreciably in growth from those kept out of doors, except that their leaf length was rather longer; doubtless because of the artificial light. There was also no appreciable difference, with Sitka spruce, in amount of growth, between the plants with roots kept at low temperature and the others. The Japanese larch with roots kept at low temperature, however, made very little growth and had foliage which appeared to be semi-wilted. The difference was clear and striking and points to marked and, under some circumstances, important physiological differences between these two species. Examination at the end of the time showed that the two Japanese larch kept with their roots in low temperature had made practically no new root growth, whereas the remaining larch and all the Sitka spruce bore obvious white developing roots.

A very great deal is owed, in the above work to the conscientious and intelligent enthusiasm of the technical assistants without which there could have been no effective continuance of work, especially during Mr. Day's absence in Cyprus.

A change to colour photography for recording some types of field observations was made during the year. It is found that reproduction in colour makes subsequent study often much more effective.

FOREST ENTOMOLOGY

Mr. G. H. Thompson continued in charge of this section in which there were no staff changes. The usual undergraduate courses were given in Forest Zoology and Animal Ecology.

Research. The fourth annual examination was made of ash and sycamore billets laid down in 1953 in Wytham Wood for the study of insect succession; this revealed little change from last year. Beneath the small areas of bark still attached to the sycamore, and the ash bark, which was still largely intact but very loose, there were many molluscs, annelids, woodlice, centipedes and millepedes, but few insect larvae or adults. Although incipient decay was apparent in the sapwood of both ash and sycamore no woodborers were present except for a few Tipulid larvae tunnelling superficially in sycamore.

Ecological studies continued on the alder woodwasp (*Xiphydria camelus* L.) and its parasites. Progress was made in elucidating the relationship between the woodwasp and a fungus which is still unidentified. All larval instars have now been obtained for the parasites *Aulacus striatus* Jur., *Pseudorhyssa alpestris* Holmgren and *Rhyssella curvipes* Grav.

MANAGEMENT

Forest management remained in the charge of Mr. F. C. Osmaston and the courses for undergraduates were unchanged. The first course included 24 lectures in Hilary and Trinity terms, a tour in the forests of Normandy and the Landes in March-April and four weeks practical work in the New Forest in September. In the second course

there were 16 lectures in Michaelmas and Hilary terms, two weeks practical work in the New Forest in March and a tour in the French and Swiss Jura in April.

Lectures were given by Mr. F. C. Osmaston, helped by Mr. T. E. Edwardson and Mr. W. A. Gordon who concentrated on aspects of management particularly applicable to Britain and tropical Commonwealth territories, respectively.

The practical work in the New Forest consisted in the preparation of a full working plan by each student for an area of 538 acres. The area provided variations in site conditions and in growing stock including both conifers and hardwoods with qualities and age-class distributions typical of many British woodlands. Problems to be solved in each plan therefore included choice of species according to site, conversion or retention of mature hardwood high forest, satisfaction of amenity demands, and afforestation of heathland, as well as the attainment of sustained yields.

In September the work consisted in the assessment of soils, site and vegetation, stockmapping, compartment description and enumeration of the growing stock. Each student then wrote and submitted for criticism Part I of his plan. After criticism these were returned. Objects of management were given to the students in March, so that they could write their full plan with prescriptions in Part II during this second visit to the New Forest in March when previous field work and application of the prescriptions could be checked on the ground.

Supervision and assistance to post-graduate students were also given, particularly to a Burmese forest officer making a special study of European forest management and yield regulation with reference to Burmese management methods, and a forest officer from Western Australia studying the organization and development of working plans.

In June-July, a special management course (combined with inventories) was organized for twenty-three forest officers on leave or deputation from the Commonwealth and Burma, on similar lines to the course provided in 1955. The eleven management lectures and discussions covered the role of working plans, their organization, preparation and control, objects of management and multiple use, the influence of silviculture on management and yield regulation, management of the forest estate as a whole, management of extensive plantations and of forests under pioneer conditions.

The lectures and discussion were succeeded by a week's tour in Wales and England and three weeks on the Continent. These tours were designed to illustrate the subject matter of lectures and show methods of management under various conditions of ownership, topography, site and market demands and the development in the organization, preparation and use of working plans. The study of modern forest management in Europe provided many examples that could help forest management in other countries—e.g. the satisfac-

tion of right holders' demands, the control of private and corporation forests, the management of large afforestation areas, the organization and preparation of working plans and the conversion of a forest from one silvicultural system to another.

The undoubted success of the tour was made possible only by the cooperation and assistance given everywhere by owners, and managers, and by field, specialist and teaching staffs. Many British and a large number of eminent continental forest officers gave freely of their time both in demonstrations and in discussions. Their willingness to point out not only successes but failures and mistakes in solving particular problems was very greatly appreciated.

MENSURATION

Teaching. The customary undergraduate course, including practical work in Bagley Wood, was given by Mr. Edwardson. A course on selected points in Mensuration, with particular emphasis on Volume Tables and Inventory was given to postgraduates. A special subject study was carried out by an undergraduate on the correlation of Hummel's Tariffs for stands and easily measured variables in the stands, some of the work being a continuation of similar studies carried out earlier by Mr. L. T. Carron.

Research. In preparation for the first re-enumeration of the Dean Forest in connection with working plan revision, work was done in the Dean on the correlation of both Hummel (conifers) and Laer Sprecher (hardwoods) tariffs, with the crop stratification by species, age class and soil type. An Indian forest officer, P. Mishra, took part in this work and prepared an advanced study report. An adequate correlation will make it possible to decide a suitable tariff for any yield plot when thinned, without re-calculating a local volume table.

Supervision was given to the work of Mr. P. Mishra and the inventory side of an advanced study by Mr. A. Wolffsohn (British Honduras) on 'Some Aspects of Tropical Forest Management'. Mr. L. T. Carron's diploma study on current European mensurational and management techniques and their application to Australia was also supervised by Mr. Edwardson.

Miscellaneous. Mr. Edwardson led a small mensurational study tour to Europe visiting the Forest Schools at Zurich and Freiberg along with the research and management stations at Brunswick, Reinbek-Hamburg and Wageningen (Holland). Ready help and useful discussion was given by the appropriate specialists at all the centres visited.

Mr. Edwardson gave one or two lectures on aspects of British forestry to Witney Young Farmers and Denman College.

AERIAL SURVEYS

The course in aerial surveys for post-graduate students was given jointly by Mr. A. R. Robbins of the Survey Department and Mr. F. C. Osmaston. The course included a special visit to the Colonial Directorate of Surveys at Tolworth where the whole process of map making

from aerial photographs was seen. Mr. R. G. Miller, in charge of the Forestry Centre of the Directorate also gave at Oxford a special lecture on the use of aerial photographs in forestry.

STATISTICS

By arrangements with the Reader in Biometry, Mr. J. Fraser Scott gave a course of lectures on elementary statistics for Forestry students.

WOOD ANATOMY

Dr. L. Chalk continued in charge of the section, with Mr. A. A. Shaw and Mr. P. G. H. Franklin as his assistants. The usual undergraduate courses were given, but owing to illness Dr. Chalk was unable to give his customary course of lectures to forest officers but the practical course was organized by Mr. A. A. Shaw.

Research. (1) *Cell wall thickness and density of early and late wood.* (a) The work on *Pinus patula* carried out by Mr. G. Fry in 1956, was supplemented by the examination of other species, particularly of indigenous East African conifers. The very thick-walled early wood tracheids found by Fry appear to be typical of conifers from this region. The results of these researches were combined in a paper published in *Forestry*. (b) A similar investigation was made on the wood of *Picea abies*, including some slow-grown material from Sweden. Small cell diameters appeared to be mainly responsible for the denser wood formed in the first few rings near the pith and in the late wood of the Swedish material; in some of the latter the cell walls were only slightly thicker than in the early wood. Comparison of two trees, one at the top and one at the bottom of a slope, showed that the lower tree had consistently more and thicker-walled late wood cells. (c) Mr. J. Ladell started work on further lines of investigation arising from the work described above.

(2) *Shrinkage of some Thailand timbers.* Mr. S. Wattanakul continued his work on a comparison of methods of measuring shrinkage, using solid blocks and sections, direct measurement and measurements made on photographs. These were applied to a study of radial and tangential shrinkage of twelve timbers and to the behaviour of different tissues and of individual cells on shrinking. An attempt was also made to determine the so-called fibre saturation point.

Terminology. The completion of the final draft of the revised Glossary of Terms used in Describing Wood for the International Association of Wood Anatomists occupied a large part of Dr. Chalk's time. This work made a valuable contribution to the preparation of Part II of the British Commonwealth Forest Terminology completed by the end of the year.

The Wood Collection. The principal additions to the collections received during the year were from Australia through the Division of Forest Products, Commonwealth Scientific Industrial Research Organization, Melbourne, Great Britain through H.M. Forestry Com-

mission, Indonesia and Surinam through Dr. J. F. Krools, New Zealand through the Forest Research Institute, Rotorua, North Borneo through the Forest Department and through Mr. G. H. Pickles, Nyasaland through the Forest Department, Northern Rhodesia through the Forestry Department, Tanganyika through the Forest Products Research Laboratory, Princes Risborough, Sierra Leone through the Department of Agriculture, U.S.A. through Yale School of Forestry and the Forest Products Laboratory, Madison. Valuable collections of slides were received from the Division of Forest Products, Commonwealth Scientific Industrial Research Organization, Melbourne, and the Forest Products Research Laboratory, Princes Risborough.

FOREST ECONOMICS

Mr. J. J. MacGregor continued in charge of this section. Mr. T. W. Irvine and Mr. F. E. Balman were mainly concerned with the surveys of costs and prices on private estates in England and Wales. Miss J. M. Johnson has been responsible mainly for secretarial work and analyses on the above surveys. Mrs. D. M. Partridge has assisted in the survey work on a part-time basis.

Teaching. Lectures and tuition in Economic Theory and in Forest Economics were given to final year students. Seminars and study groups of forest officers were also arranged.

Research. The main research has been concerned with surveys of the economy of private woodlands in England and Wales and reports on Costs and on Prices were published during the year. Detailed study and critical reviews of the Report of the Committee on the Marketing of Woodland Produce were prepared for the national press and the Journal of the Royal Agricultural Society of England and Wales. A paper was prepared for the Seventh British Commonwealth Forestry Conference as a discussion of the broad principles of planned land use with special reference to relationships between agriculture and forestry.

Two large and independent studies of U.S. timber resources and future prospects were the subject of review and led to a proposal that similar studies should be undertaken in Britain.

Supervision. The forest economist acted as supervisor for two postgraduate students preparing theses for B.Litt., and D.Phil. degrees, on subjects broadly concerned with the economics of land-owning in the nineteenth century and on the competition between agriculture and forestry for resources.

Committees. In the summer of 1957 Mr. MacGregor attended, as U.K. representative, the first meeting of the Study Group on a Multilingual Glossary of Forest Work Science in Geneva under the auspices of the U.N. Food and Agriculture Organization and Economic Commission for Europe. He continued as a member of the Oxon and Bucks Divisional Committee of the Royal Forestry Society of England and Wales.

Conferences. The forest economist attended during the summer of 1957 a conference on the theme of *How Should We Grow Our Conifers?* held at Dartington Hall. He was one of the two opening speakers on a session on *Should We Grow Trees Principally for Timber or for Other Purposes?* He also attended the summer meeting of the Agricultural Economics Society held in Edinburgh.

FOREST LAW, TAXATION AND ADMINISTRATION

British Forest Law, etc. Mr. W. A. Gordon gave a course of 20 lectures on British Forest Law, Land Tenure and Taxation to a class of 12 postgraduate and fourth year undergraduates. Only one candidate chose his additional subject for the Final Honour School of Forestry in this field.

Mr. Gordon also conducted two seminars for postgraduates on the Law of Evidence and Contract, and gave lectures on the legal aspects of Forest Protection to the third year students.

Colonial Forest Administration. Mr. Gordon gave a course of 10 lectures to a class of 10-15 graduates and fourth year undergraduates. Three candidates took and passed in this as their additional subject in the Final Honour School of Forestry.

FOREST UTILIZATION AND ENGINEERING

Colonel A. H. Lloyd continued in charge of this section and gave the usual university course of lectures in Forest Utilization and Engineering, with field work in road alignment and timber bridges. The Overseas Forest Officers were given lectures on forestry tools and equipment, and a practical course was held in the sharpening and maintenance of saws and axes in the Institute workshops. Four special films were shown on mechanized timber extraction methods.

A course in the maintenance and repair of motor vehicles was attended by eleven Overseas Forest Officers at the City of Oxford Technical College and a very useful short practical course on the decarbonization and repair of Land Rovers was held at Coventry and attended by all forest officers interested.

Hardwood sawmills and seasoning kilns were visited at High Wycombe and the manufacture of bandsaws was studied at a neighbouring factory. Hardwood timber storage was seen in the London Port Authorities' sheds, and the veneer showrooms and timber yards of Wm. Mallinson & Sons Ltd., were also visited.

Overseas Forest Officers visited plywood and match factories during a tour to Holland and a timber storage centre in Amsterdam. The annual demonstration of forestry tools and equipment, held in Bagley Wood in June, included portable fire-fighting pumps and a test of the effectiveness of Borax chemical mixtures in fire extinguishing and prevention. Various types of cutting and mowing machines for the clearing and pulverising of bracken and light thorn scrub were demonstrated, including the Scrub-Masta and the new 'Swipe' machine of the Wolseley Engineering Co.

By arrangements kindly made with the Forestry Commission several students were able to visit new road construction and to see

the extraction of thinnings in the Lake District and in Scotland.

A completely new type of Skyline Crane with an automatic pressure-controlled log carriage, taking loads up to 5 tons, was inspected in Switzerland. By arrangement with a visiting forest officer from Australia, operational tests were carried out under conditions as similar as possible to those in the hardwood forests of New Guinea where the installation of one of the new type Skylines is under consideration.

FOREST PROTECTION

A course of lectures was given by Colonel Lloyd on fire Protection; also one on measures for the reduction or prevention of erosion on mountain slopes and against encroaching sand-dunes. Legal aspects of protection were dealt with by Mr. W. A. Gordon and the economies of the subject by Mr. J. J. MacGregor.

SURVEYING

The usual course in Surveying was given in the Trinity Term by Mr. A. R. Robbins of the Department of Surveying.

LIBRARY

Miss G. Guiney continued in charge of the Library, with Mr. E. F. Hemmings maintaining the Catalogues, and Miss D. R. Castell and Miss S. M. Bishop as assistants.

Statistics, with figures for last year bracketed, are:

Accessions:

Issues of periodicals	...	...	...	2015	(2171)
Current annual reports	...	...	...	201	(191)
Books	...	...	...	224	(150)
Miscellaneous	...	...	...	1757	(1035)
Maps	...	...	...	88	
Total	...	...	...	4285	(3547)

The Commonwealth Forestry Bureau deposited 315 (541) items: (in last year's report the entry should have been 541 (361)). Items received by direct request were 109 (46).

Loans:

To Staff:

Periodicals					
In circulation	...	...	...	2754	(2799)
Direct	...	...	...	194	(313)
Books	...	...	...	265	(226)
Miscellaneous	...	...	...	256	(323)
Total	...	...	...	3469	(3661)

To Students:

Books	...	...	...	974	(1180)
Periodicals	...	...	...	258	(257)
Miscellaneous	...	...	...	505	(472)
Total	...	...	...	1737	(1909)

To Bureau:

Books	...	...	...	...	60	(39)
Periodicals	...	...	...	...	426	(367)
Miscellaneous	...	...	...	...	190	(269)
Total					676	(675)

To visitors and correspondents:

Books	...	...	...	...	68	(60)
Periodicals	290	(304)
Miscellaneous	354	(241)
Total					712	(605)

Total loans:	6594	(6859)
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New periodicals entered, 7: one each from Argentina, Australia, Chile, China, Cyprus and Israel, one international.

New series begun, including Annual Reports, 57: from 31 countries, Alaska, Algeria, Arabia, Argentina, Australia, Austria, Canada (2), Finland, France, Germany (5), Ghana, Greece, India, Indonesia, Kenya (4), Korea (2), Lebanon, Mexico (2), Morocco (2), Netherlands, Nigeria, Norway, Portugal (3), Ryukyu Islands, Southern Rhodesia, Spain, Sweden, Switzerland (2), Tanganyika, United Kingdom (5), United States of America (6), and international (3).

Contents of the Library. In last year's report the number of books in the library should read 12,000 not 9,500. The number of maps now filed is about 540.

Correspondence. Letters sent 1816 (1858); received 1026 (996).

Sales of Institute publications. £98. 10s. 5d. (£88. 16s. 8d.).

Catalogue Room. The intake of cards into the 'Oxford' catalogue continues to rise. 17,274 (15,814) cards were filed under their subjects or countries, and 8,162 (7,558) under authors; thus the grand total of 25,436 (23,372) exceeds anything recorded in previous years.

For the Commonwealth Forestry Bureau's Centralized Title Service some 516,742 (272,504) cards and flimsies were produced on the Multilith duplicating machine operated by the bureau, and distributed to 79 (60) recipients, some of whom subscribe to as many as four or five sets.

All Multi-author cards have now been arranged in one chronological sequence.

Some particularly lengthy corrigenda slips issued by the Bureau took several weeks to deal with. 843 new guide cards were inserted. The catalogue was respaced and relabelled during the Christmas vacation.

The annual need for index cabinets has increased from five to six.

The 'Flury' catalogue (1934-1950) received 214 (380) additional entries.

Mr. Hemmings continued to be responsible for the arrangement and distribution of the duplicate stock. Early in 1957 the second respacing of the basement was completed; very little space now remains there.

Staff. Both Miss Castell and Miss Bishop passed the Library Association examination qualifying them as Associates, and Miss Bishop was promoted to the position of Assistant Librarian Grade II. There was no staff change during the year.

General. About 200 maps have now been lettered and hung in special cabinets. Considerable rearrangement of shelves and drawers, with resultant relettering, was carried out. Severe restriction of space has again necessitated removal of much material to the basement. The usual talks and demonstrations were given in Michaelmas Term to all categories of new readers, and an illustrative display of publications arranged for the Inventory and Management Course in June.

Many visitors and temporary readers were welcomed. Amongst these were Professor S. Yie (National Taiwan University, Formosa), Dr. I. Gülen (University of Istanbul), Mme Guillemain-Gouvernel (Centre Technique des Bois, France), Mr. T. C. Whitmore (Botany School, Cambridge), Mr. Vali Mechklaky (Iran), Dr. and Mrs. Boyko (Israel), Mr. Andrew Stewart (University of Western Australia), Dr. King (Boyce Thompson Institute, New York), Mr. Tatu Mokëlää (Finland), Dr. Gordon Gould (Los Alamos, New Mexico), Miss Eli Sandven (Bergen Public Library, Norway), Senhor S. Lopes (Serviços Florestais, Lisbon), Mr. O. Alpay (Forest Research Institute, Ankara).

Gifts. Many benefactors enriched the library during the year, too many to name in detail. They include several persons and institutions whose interest has been maintained over a long period; to these, and to all donors, grateful acknowledgement is offered. Special mention should be made of: Dr. G. W. Dimbleby for a set of the papers of the 8th International Botanical Congress, 1954; Miss Withycombe (Commonwealth Forestry Bureau) for Australian Tree Portraits, by C. P. Mountford, 1956; Mr. G. M. Serephim (Cyprus) for his typescript on the forests of Lebanon, Jordan and Syria, 1956; Mr. G. E. S. Cubitt, O.B.E., for early issues of the Malayan Forester and Malayan Forest Records; Dr. Else Jahn (Austria) for a number of reprints; the Chief Conservator of Forests, Rangoon, Burma, for 26 Working Plans; Monsieur l'Inspecteur General d'Agriculture, Algeria, for a set of Soil Maps of Algeria; Miss D. Pope (Chinese Library, Oxford) for a set of National Geographic Society maps; and especially of Mrs. Chrystal for books from the library of the late Dr. R. N. Chrystal.

PHOTOGRAPHIC SECTION

During the year the following items were dealt with:

Prints and enlargements	...	...	6025	(5850)
Negatives processed	...	...	1200	(1140)
Photographs and photomicrographs taken	...	...	554	(316)
Lantern slides	...	...	128	(70)

Miscellaneous items included dry mounting, mounting of 2 in. by 2 in. slides, making of photographic stencils, repair of maps, heat sealing of notices etc., indexing of photographs and lantern slides for the Institute collection, and operation and maintenance of the projection equipment.

WORKSHOPS

The workshops continued with two metal workers, Mr. E. J. Howell and Mr. I. Abbot who was engaged in May of this year, and Mr. J. W. Howkins in the wood-working shop.

The usual maintenance work in the building and modification of existing apparatus continued. Assistance was also given in the construction and modification of equipment for the Forestry Commission Nursery at Kennington.

Major items of equipment made during the year include:

Wood-working shop

1. Under-bench units.
2. Fume cupboard.
3. 5 Card index cabinets (Periodicals Room).
4. Diagram blinds.
5. Furniture (Bureau).
6. Modification of refrigerator to enable plant studies to be made.
7. 20 Lantern slide boxes.
8. Insect breeding cages.
9. Camera equipment carrying case.

Metal Workshop

1. Pressure vessels in brass.
2. Copper sieves.
3. Modification to grinding mill and perspex saw.
4. Camera tripod attachment.
5. Adjustable stage (photographic).
6. Greenhouse humidity control.

APPENDIX I PUBLICATIONS GENERAL

Original Publications

The Imperial Forestry Institute between 1947 and 1956, by H. G. Champion. Paper prepared for the Seventh British Commonwealth Forestry Conference, 1957.

Thoughts on Higher Forestry Education, by H. G. Champion. Paper prepared for the Seventh British Commonwealth Forestry Conference, 1957.

Notes on the History of Wytham Estate, with special reference to the Woodlands, by E. W. Jones and A. J. Grayson. *Imperial Forestry Institute*, 1956.

Forestry in Great Britain, The Commonwealth and Europe, by A. H. Lloyd. *Encyclopaedia Britannica 'Book of the Year'*, 1957.

Trees, Shrubs and Man in Northern Rhodesia, by F. White. *Journal of the Oxford University Forestry Society*, Fourth Series, No. 5: 38-43 (1957).

Reviews

Trees, Woods and Man, by H. L. Edlin, 1956. *Journal of the Royal Horticultural Society* LXXXI: 508-9. (H. G. Champion).

Trees, Woods and Man, by H. L. Edlin, 1956. *Yearbook of the Botanical Society of the British Isles*, 1957. (E. W. Jones).

Economics of Plantations, by W. E. Hiley and Profitable Forestry, by Lord Bolton. *Nature*, 179: 1319 (H. G. Champion).

Economics of Plantations, by W. E. Hiley. *Forestry*, XXX: 101-02 (H. G. Champion).

SILVICULTURE

Original Publication

The potentialities of savanna woodland, by E. W. Jones. Paper prepared for Seventh British Commonwealth Forestry Conference, 1957.

Reviews

Studies of North-West American Forests in relation to Silviculture in Great Britain, by R. F. Wood, and Sitka Spruce in British Columbia. A Study in Forest Relationships, by W. R. Day. *Forestry*, XXX: 204-6 (E. W. Jones).

ECOLOGY

Original Publications

Pollen Analysis of Terrestrial Soils, by G. W. Dimbleby. *New Phytologist*, 56: 12-28.

Water Movement in a Sandy Soil, by R. Nicholson (Edited by G. W. Dimbleby). *Journal of the Oxford University Forestry Society*, Fourth Series, No. 5: 17-21 (1957).

The Diagnosis of Mineral Deficiencies in Forest Crops, by L. Leyton. Paper prepared for the Seventh British Commonwealth Forestry Conference, 1957.

Needle composition in relation to the growth and nutrition of Japanese larch, by L. Leyton. *Analyse des plantes et problèmes des fumures minérales. VIe Congrès International de la Science du Sol*. Paris, 1956.

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APPENDIX II

I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

- PROFESSOR SIR HARRY CHAMPION, C.I.E., M.A., D.Sc. (Oxon.).
Tropical Forestry, Forest Policy.
- L. CHALK, M.A., D.Phil. (Oxon.). Wood structure and Properties.
- W. R. DAY, B.Sc., M.A. (Oxon.). Pathology, Forest Hygiene.
- A. H. LLOYD, O.B.E., M.C., T.D., M.A. (Oxon.). Forest Engineering and Utilization.
- E. W. JONES, M.A. (Oxon.). Ph.D. (Cantab.). Silviculture.
- G. H. THOMPSON, B.Sc., M.A. (Oxon.). Forest Zoology, Entomology.
- T. E. EDWARDSON, M.A. (Oxon.), B.Sc. (For.) (Edin.). Mensuration, British Forestry.
- W. A. GORDON, M.A., Dip. Anth. (Oxon.), Bar. at Law (Lond.).
Colonial Forestry, Forest Law.
- F. C. OSMASTON, M.A. (Oxon.). Forest Management, Aerial Survey.
- J. J. MACGREGOR, B.Sc. (Glasgow), M.S. (Wisc.), B.Litt., M.A. (Oxon.). Forest Economics.
- W. R. C. HANDLEY, M.A. (Oxon.), Ph.D. (Leeds). Microbiology.
- L. LEYTON, M.A. (Oxon.), Ph.D. (Leeds). Tree Physiology.
- G. W. DIMBLEBY, B.Sc., M.A., D.Phil. (Oxon.). Forest Ecology.
- H. RAUDNITZ, Ph.D. (Prague). Chemistry.
- A. C. HOYLE, B.Sc., M.A. (Oxon.). Forest Botany and Ecology.
- F. WHITE, M.A. (Oxon.), M.A. (Cantab.). Forest Botany.
- A. CARLISLE, B.Sc. (For.) (Bangor), Ph.D. (Aberdeen). Forest Hydrology.

II. STAFF OF OTHER UNIVERSITY DEPARTMENTS ASSISTING IN INSTRUCTIONAL WORK

- R. K. SCHOFIELD, M.A. (Oxon.), Ph.D. (Cantab.). Soil Science.
- G. R. CLARKE, B.Sc., M.A. (Oxon.). Soil Science.
- A. R. ROBBINS, B.Sc., M.A., D.Phil. (Oxon.). Surveying and Aerial Survey.
- J. FRASER SCOTT, M.A. (Oxon.). Statistical Methods.

III. OTHER STAFF

- Secretary: Miss H. M. EDWARDS
- Assistant Secretary: Miss I. BLAGROVE
- Accountant: Mr. A. A. ADAMS
- Librarian: Miss G. GUINEY
- Assistant Librarians:
Miss D. R. CASTELL, M.A. (Oxon.), Mr. E. F. HEMMINGS

